



describe

SD5252F It is a high-performance solar lawn lamp boost control chip, suitable for solar lawn lamps powered by a 1.2V rechargeable battery.

The main functions include charging control, boost drive, light control, etc. Solar lawn lights mainly use the energy of solar cells to work. When sunlight shines on the solar cell during the day, the light energy is converted into electrical energy and stored in the battery, and then the battery provides power for the LED (light emitting diode) of the lawn light at night. It has the advantages of safety, energy saving, convenience, and environmental protection.

SD5252F The use of green and environmentally friendly TO-94 packaging and at least one peripheral device can effectively reduce the circuit PCB layout space.

SD5252F can operate in the temperature range of -40°C to $+85^{\circ}\text{C}$.

Features

• **High efficiency: 83% (typical value), can fully**

Using solar cells

• **Fewer peripheral components: Only one inductor is required**

• **Low voltage battery protection function**

• **Input current can be adjusted by adjusting the inductance**

Application • Solar

lawn lights

• **LED drive power**

• **Landscape decorative light string**

• **Indoor decorative light string**

Application Schematic

a) Single color LED application circuit diagram

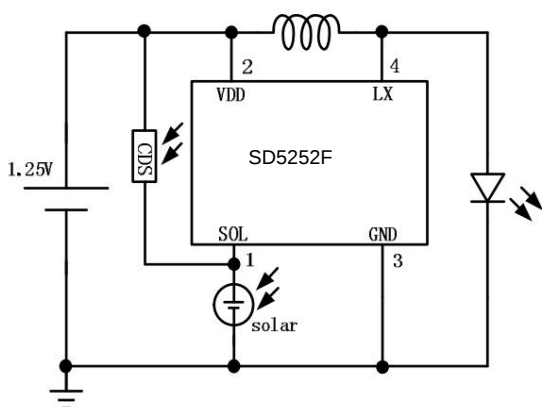


Figure 1. Photoresistor control enable

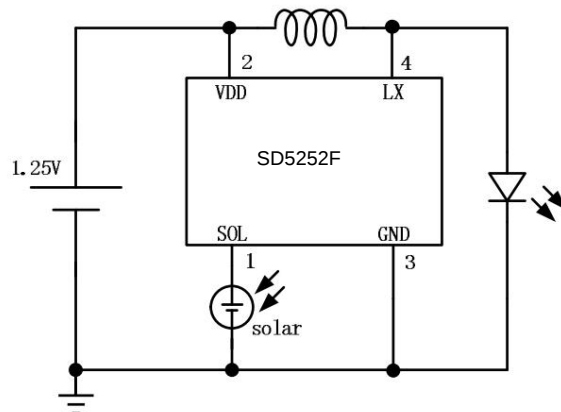


Figure 2. Solar cell control enable

b) Colorful LED application circuit diagram

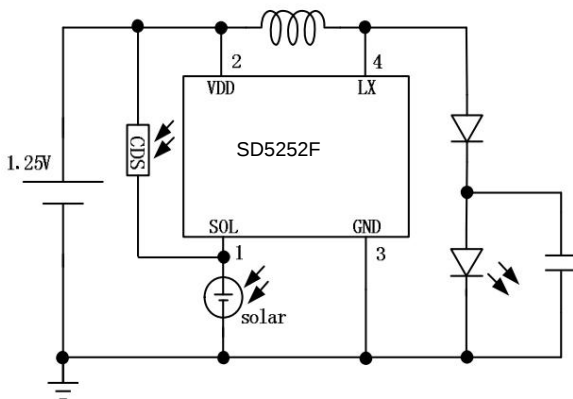


Figure 3. Photoresistor control enable

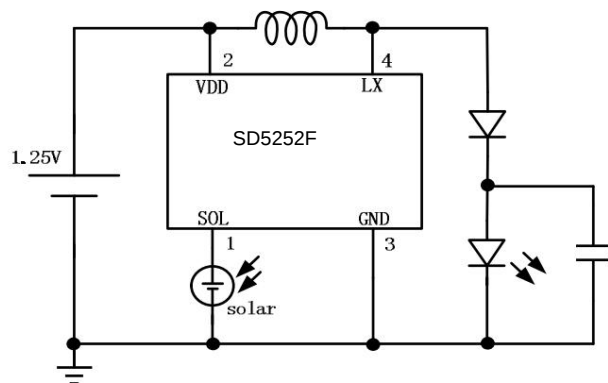


Figure 4. Solar cell control enable

c) Switch connection

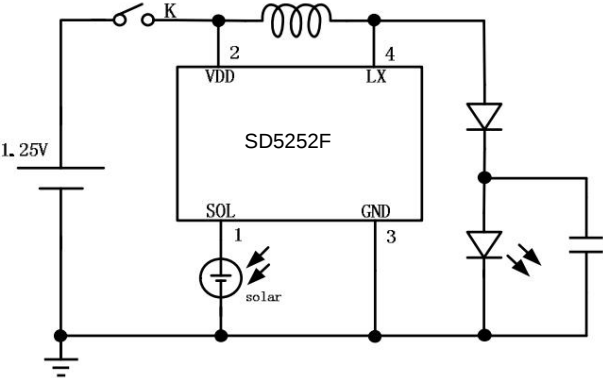


Figure 5. Recommended connection method 1

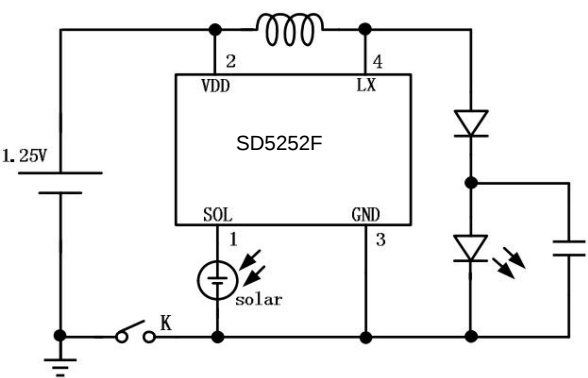


Figure 6. Recommended connection method 2

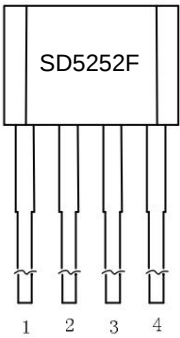
Ordering Information

Device Model	Order Number	Package Description	Storage Temperature	Package Marking	Packaging Options	Remark
SD5252F	SD5252FT004B	TO-94	-65y to +125y		Bag	



Pin Information

Table 1. Pin Description

Pinout	name	Pin Function Description	TO-94 
1	SOL	SOL is connected to the positive terminal of the solar cell, enabling and charging control terminal	
2	VDD	Power supply	
3	GND	land	
4	LX	Power switch drain	

Absolute Maximum Ratings

describe		scope	unit
Supply voltage		-0.3 ~ 5	In
Other pins		-0.3 ~ 5	In
Maximum power consumption		0.5	IN
Storage temperature range		-65 ~ +125	°C
Junction temperature		150	°C
Soldering temperature		260±10s	°C
Electrostatic discharge (ESD)	HBM (Human Body Mode)	2000	In
	MM (Machine Mode)	200	In

Heat loss information

describe		scope	unit
Package Thermal Resistance (θJA)	TO-94	150	°C/W
Power consumption, PD@TA=25°C	TO-94	0.6	IN

Recommended operating conditions

describe		scope	unit
Operating Junction Temperature		-40 ~ 125	°C
Operating temperature		-40 ~ 85	°C
Supply voltage		+0.9 ~ +1.8	In
Continuous input current		5±40	m.a.



Electrical properties

(VIN = 1.2V, TA = 25°C, unless otherwise specified.)

parameter	symbol	Test conditions	Min	Typ	Max	Unit
Power Input						
Input voltage range VIN		IIN=40mA	0.9		1.8	V
Input current range IIN		VIN=1.2V L=10µH	3		40	mA
Off-state current ISD		VIN=1.2V VCE=0.4V		30		µA
Power Switch						
Switch on resistance RDS(ON)		VIN=1.2V IIN=40mA L=10µH		1.85		Ohm
Output leakage current IL	LEAKAGE	VSOL=2.4V		6		µA
solar control						
Enable input threshold	V on-off	VIN=1.2V		0.37		V
	V Off-On			0.29		V
Minimum charging voltage difference VCHmin		VIN=1.2V ISOL =1mA		87.8		mV
Charging Capacity	I	VIN=1.2V VSOL-VDD=300mV		86.5		mA
Enable input resistor RSOL-GND				33		KΩ
Operating frequency						
Operating frequency	flx	VIN=1.2V L=82µH		295		KHz
Work efficiency						
Work efficiency	or			83		%
Over discharge voltage						
Over discharge voltage	VOD	L=82µH		0.9		V



Functional Block Diagram

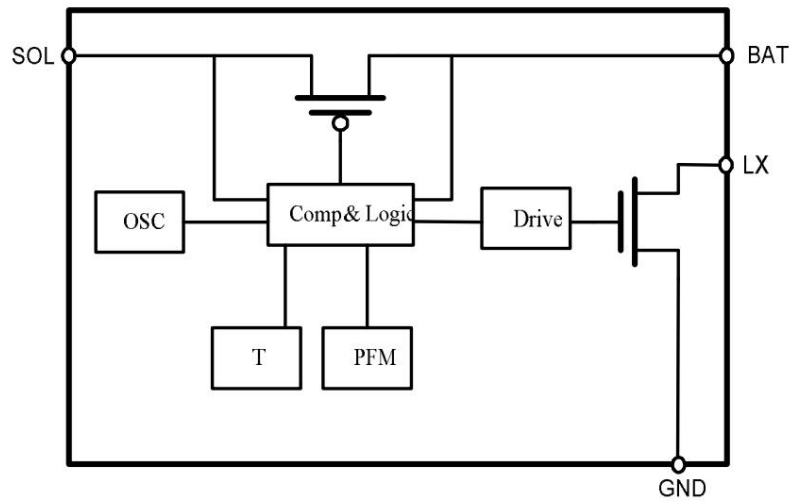
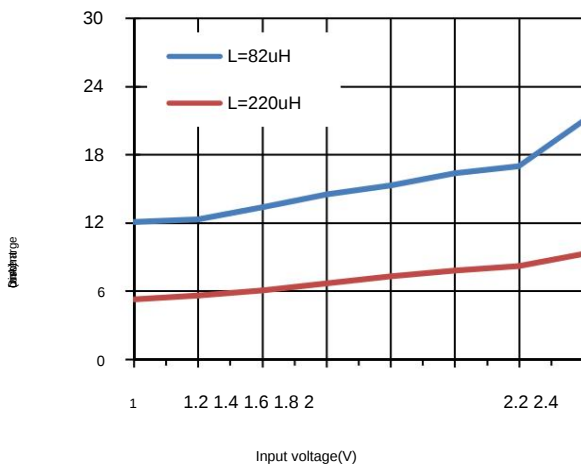


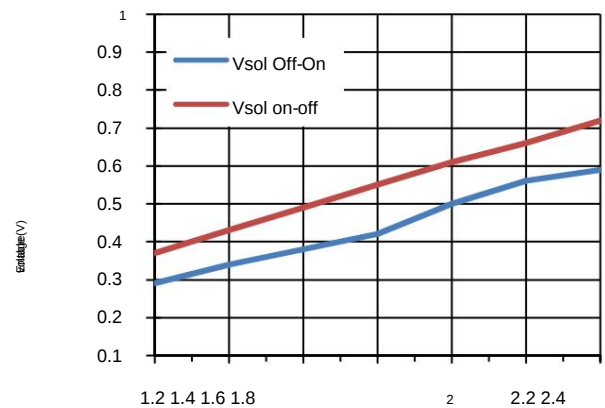
Figure 2 Internal logic block diagram

Typical characteristic curve

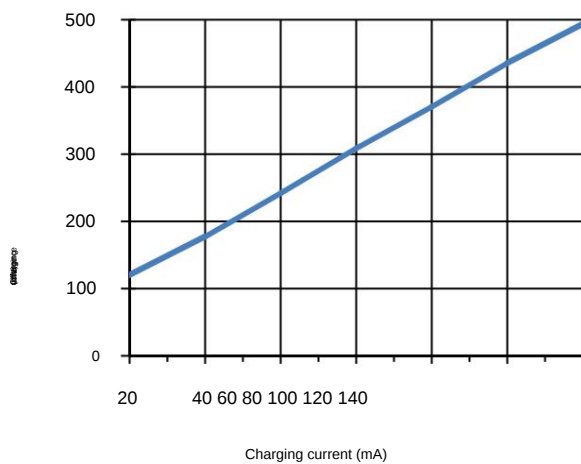
VIN = 1.2V, L = 82 μ H (0307), load 1 white LED, TA = 25°C, unless otherwise specified. Discharge Current vs. Input Voltage



Enable Voltage vs. Input Voltage



Charging Voltage Dropout vs. Charging Current





How it works

5252F is a solar lawn light LED driver control chip with an input current range of 3mA to 80mA. 5252F is suitable for 1 rechargeable battery

The solar lawn light powered by the 5252F can achieve different input current control through different circuit connection methods and inductor matching.

Current Regulation Reference

5252F changes the input current by changing the peripheral inductance value. The following table lists the connection method in Figure 2, when driving a white light LED, the inductance and input current Relationship:

Table 1. Connection method of Figure 1 and Figure 2

For reference only, subject to actual measurement

Inductor	Specification	LED Load	Input current (mA)
220uH	0307	1 white LED	5.3
150uH			7.9
82uH			13.9
68uH			18.2
47uH			25.4
22uH			46.8

Table 2. Connection method of Figure 3 and Figure 4

For reference only, subject to actual measurement

Inductor	Specification	LED Load	Input current (mA)	Output current (mA)
220uH	0307	1 white LED		1.8
150uH			7.7	2.7
82uH			13.5	4.2
68uH			18.3	4.8
47uH			25.7	7.9
22uH			49.3	14.8

Charge, discharge and enable control

The SOL pin is connected to the positive pole of the solar panel, and the BAT pin is connected to the positive pole of the rechargeable battery. During the day, the solar cell converts sunlight into electrical energy to charge the battery.

At night the battery discharges to drive the LED.

The internal high-precision comparator monitors the SOL and BAT pin voltages. When the SOL voltage is 30% higher than the BAT voltage, the chip enters shutdown mode and turns off the LED.

When the SOL voltage is 22% lower than the BAT voltage, the chip resumes normal operation and turns on the LED, thereby realizing the light control function, automatically turning off the LED during the day and automatically turning on the LED at night.

This function does not affect the SOL charging function to BAT.

Power consumption considerations

The chip junction temperature depends on many factors such as ambient temperature, PCB layout, load and package type. The power consumption and chip junction temperature can be calculated according to the following formula:

$$PD = RDS(ON) \times I_{OUT}^2$$

According to the PD junction temperature, it can be calculated by the following formula:

$$T_J = PD \times \theta_{JA} + T_A$$

in

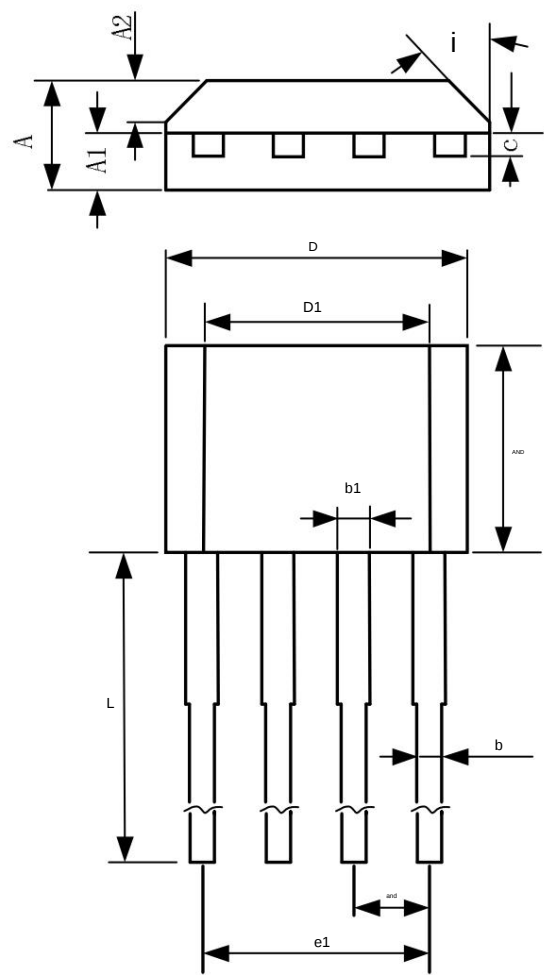
T_J is the chip junction temperature

T_A is the ambient temperature

θ_{JA} is the package thermal resistance

Package Dimensions

TO-94



TO-94 package mechanical data

symbol	dimensions			
	millimeters		inches	
	min	max	min	max
A	1.520	1.720	0.059	0.067
A1	0.700	0.900	0.028	0.035
A2	0.500	0.700	0.020	0.028
C	0.360	0.500	0.014	0.020
b b1	0.380	0.550	0.015	0.022
D	4.980	5.280	0.196	0.208
D1	3.780	4.080	0.149	0.161
and	3.450	3.750	0.136	0.148
and	1.270 TYPE		0.050 TYPE	
e1	3.710	3.910	0.146	0.154
L	14.900	15.300	0.587	0.602
ÿ	45ÿ TYPE		45ÿ TYPE	